

## CLAIMS

We claim:

1. A method for synchronizing a TTR clock during a Channel Discovery  
2 Phase of a DSL service initialization operating in a TCM-ISDN noise environment, the  
3 method comprising:  
4 transmitting a C-COMB signal to a customer premises DSL transceiver during  
5 the Channel Discovery Phase, the C-COMB signal including a TTR  
6 indication portion allowing the customer premises DSL transceiver to  
7 synchronize a TTR clock; and  
8 during a quiet period of the Channel Discovery Phase, transmitting a TTR  
9 indication signal to the customer premises DSL transceiver to maintain  
10 synchronization of the transceiver's TTR clock.

1. The method of claim 1, wherein the TTR indication signal comprises at  
2 least one hyperframe that includes:  
3 a first set of symbols for indicating the hyperframe boundary; and  
4 a second set of symbols having no signal for allowing quiet noise  
5 measurement.

1. The method of claim 2, wherein the first set of symbols includes the first  
2 continuous group of symbols of the hyperframe dominated by far-end crosstalk  
3 interference.

1           4.       The method of claim 3, wherein the TTR indication signal comprises a  
2       COMB or inverted COMB signal transmitted during each of the first set of symbols.

1           5.       The method of claim 3, wherein the TTR indication signal comprises a  
2       REVERB signal transmitted during the first set of symbols.

1           6.       The method of claim 5, wherein the REVERB signal includes a range of  
2       sub-carriers selected in a frequency range low enough to avoid being attenuated when  
3       transmitted to the customer premises DSL transceiver.

1           7.       The method of claim 2, further comprising:  
2               measuring at least one quiet noise parameter during the second set of symbols.

1           8.       The method of claim 7, wherein the measured quiet noise parameter is  
2       quiet noise level per bin.

1           9.       The method of claim 7, wherein the measuring at least one quiet noise  
2       parameter is performed for symbols in the presence of far-end crosstalk or near-end  
3       crosstalk.

1           10. A method for maintaining TTR synchronization in a customer premises  
2           DSL transceiver during a Channel Discovery Phase of a DSL service initialization  
3           operating in a TCM-ISDN noise environment, the method comprising:  
4           receiving a TTR indication signal from a central office DSL transceiver, the  
5           TTR indication signal comprising at least one hyperframe that includes  
6           a plurality of symbols, some of which contain no signal from the central  
7           office DSL transceiver;  
8           using at least a portion of the TTR indication signal to synchronize a local TTR  
9           clock thereto; and  
10           measuring a quiet noise parameter during symbols of the hyperframe in which  
11           no signal is received from the central office DSL transceiver.

1           11. The method of claim 10, wherein the TTR indication signal comprises at  
2           least one hyperframe that includes:  
3           a first set of symbols for indicating the hyperframe boundary; and  
4           a second set of symbols having no signal for allowing quiet noise  
5           measurement.

1           12. The method of claim 11, wherein the first set of symbols includes the first  
2           continuous group of symbols of the hyperframe dominated by far-end crosstalk  
3           interference.

1           13. The method of claim 12, wherein the TTR indication signal comprises a  
2           COMB or inverted COMB signal transmitted during each of the first set of symbols.

1           14. The method of claim 12, wherein the TTR indication signal comprises a  
2           REVERB signal transmitted during the first set of symbols.

1           15. The method of claim 14, wherein the REVERB signal includes a range of  
2           sub-carriers selected in a frequency range low enough to avoid being attenuated when  
3           transmitted to the customer premises DSL transceiver.

1           16. The method of claim 11, further comprising:  
2           measuring at least one quiet noise parameter during the second set of symbols.

1           17. The method of claim 16, wherein the measured quiet noise parameter is  
2           quiet noise level per bin.

1           18. The method of claim 16, wherein the measuring at least one quiet noise  
2           parameter is performed for symbols in the presence of far-end crosstalk or near-end  
3           crosstalk.

1           19. A central office DSL transceiver for maintaining synchronization of a  
2           customer premises TTR clock during a Channel Discovery Phase of a DSL service

3 initialization operating in a TCM-ISDN noise environment, the transceiver configured to  
4 perform the operations:

5 transmitting a C-COMB signal to a customer premises DSL transceiver during  
6 the Channel Discovery Phase, the C-COMB signal including a TTR  
7 indication portion allowing the customer premises DSL transceiver to  
8 synchronize a TTR clock; and  
9 during a quiet period of the Channel Discovery Phase, transmitting a TTR  
10 indication signal to the customer premises DSL transceiver to maintain  
11 synchronization of the transceiver's TTR clock.

1 20. The transceiver of claim 19, wherein the TTR indication signal comprises  
2 at least one hyperframe that includes:

3 a first set of symbols for indicating the hyperframe boundary; and  
4 a second set of symbols having no signal for allowing quiet noise  
5 measurement.

1 21. The transceiver of claim 20 wherein the first set of symbols includes the  
2 first continuous group of symbols of the hyperframe dominated by far-end crosstalk  
3 interference.

1 22. The transceiver of claim 21, wherein the TTR indication signal comprises a  
2 COMB or inverted COMB signal transmitted during each of the first set of symbols.

1           23. The transceiver of claim 21, wherein the TTR indication signal comprises a  
2           REVERB signal transmitted during the first set of symbols.

1           24. The transceiver of claim 23, wherein the REVERB signal includes a range  
2           of sub-carriers selected in a frequency range low enough to avoid being attenuated when  
3           transmitted to the customer premises DSL transceiver.

1           25. The transceiver of claim 20, the transceiver further configured to perform  
2           the operation:

3           measuring at least one quiet noise parameter during the second set of symbols.

1           26. The transceiver of claim 25, wherein the measured quiet noise parameter is  
2           quiet noise level per bin.

1           27. The transceiver of claim 25, wherein the measuring at least one quiet noise  
2           parameter is performed for symbols in the presence of far-end crosstalk or near-end  
3           crosstalk.